

Remarks

Claims 1-26, 31-38, 43-45, 60-67, 72, and 86 were pending in the subject application. Claims 4-6, 13-16, 20-26, and 60-67 remain pending but withdrawn from consideration. By this Amendment, claims 1-3, 7, 31, 43, and 72 have been amended and claim 86 has been cancelled. Support for the amendments can be found throughout the subject specification and in the claims as originally filed. Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 1-3, 7-12, 17-19, 31-38, 43-45, and 72 are currently before the Examiner for consideration. Favorable consideration of the pending claims is respectfully requested.

Applicants acknowledge that claims 4-6, 13-16, 20-26, and 60-67 have been withdrawn from further consideration as being drawn to a non-elected invention. However, Applicants wish to reserve the right to request rejoinder of the non-elected method claims upon an indication of an allowable compound claim in accordance with MPEP §821.04.

As an initial matter, the Examiner has objected to the Declaration/Power of Attorney document that was submitted in the subject application on the grounds that the second inventor made a change to her address without dating and initialing the revision. Submitted herewith is a revised, executed Declaration/Power of Attorney document for the subject application. Entry and consideration of the Declaration/Power of Attorney document submitted herewith is respectfully requested. Accordingly, withdrawal of the objection is respectfully requested.

The Examiner has objected to the specification on the ground that the Brief Description of the Drawings does not include sequence identifiers for the sequences in Figure 1. The Examiner has also objected to the title of the application on the ground that it is not descriptive of the invention. By this Amendment, Applicants have amended the title of the application to read "Heat Stable Variants of Plant Adenosine Diphosphate Glucose Pyrophosphorylase Small Subunit." In addition, Applicants have amended the sequence listing and the specification to include sequence identifiers for the sequences shown in Figure 1. Accordingly, reconsideration and withdrawal of these objections is respectfully requested.

Claims 43 and 72 are objected to because of an informality. By this Amendment, Applicants have amended claims 31, 43, and 72 to include the entire text of claim 1 rather than simply referring

back to the “polynucleotide of claim 1.” Accordingly, reconsideration and withdrawal of the objection is respectfully requested.

Claims 1-3, 7-12, 17-19, 31-38, 43-45, and 72 are rejected under 35 USC §112, second paragraph, as indefinite. Applicants respectfully assert that the claims as filed are definite. In one aspect of this rejection, the Examiner asserts that the language “relative to wild type AGP enzyme” is a relative term which renders the claims indefinite. Applicants respectfully assert that the claim language is clear and definite. However, by this Amendment, Applicants have amended the claims to replace the term “relative to” with the term “when compared to.” Also under this §112 rejection, the Examiner asserts that the language “or fragment thereof” renders the claims indefinite because it is unclear whether the “fragment” is required to exhibit increased heat stability when expressed with a large subunit. By this Amendment, Applicants have amended the claims to clarify that the “fragments” encompassed by the claim language are those that do comprise the mutation and do increase heat stability of an AGP enzyme. Accordingly, reconsideration and withdrawal of the rejection under 35 USC §112, second paragraph, is respectfully requested.

Claims 1-3, 7, 9, 17-19, 31-38, 43-45, and 72 are rejected under 35 USC §112, first paragraph, as non-enabled and as lacking written description by the subject specification. Specifically, the Examiner asserts that the specification does not enable or provide adequate written description for any mutant AGP enzymes other than those that have a cysteine substituted for tyrosine at position 36 of the maize small subunit. Applicants respectfully assert that the claims are enabled and do find written description in the subject specification. A person of ordinary skill in the art, having the benefit of the teachings of the subject application, would have been able to make and use mutant AGP small subunits of the claimed scope and of plants other than maize. In addition, a person of ordinary skill in the art would understand that Applicants were in possession of the claimed invention. The subject specification teaches several species of the claimed genus of the invention. Moreover, Applicants note that the amino acid sequence of AGP small subunit was known in the art at the time of the present invention for numerous different plant species and an ordinarily skilled artisan, having the benefit of the teachings of the subject specification, would be able to identify corresponding mutations in the small subunit for heat labile plants other than maize. A person of ordinary skill in the art, having the benefit of the teachings of the subject specification,

can prepare mutant plant small subunits and determine whether the mutant small subunit provides for increased heat stability of an AGP enzyme. Applicants respectfully submit that while some experimentation may be necessary, it is not controlling on the issue of undue experimentation. *Ex parte Jackson*, 217 USPQ 804, 807 (Bd. Pat. App. & Int. 1982) (“The test [for undue experimentation] is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine . . .”) (emphasis added). Accordingly, reconsideration and withdrawal of the rejections under 35 USC §112, first paragraph, is respectfully requested.

Claims 1-3, 7-12, 31, 43, and 72 are rejected under 35 USC §102(b) as anticipated by Ballicora *et al.* (1995). The Examiner asserts that the Ballicora *et al.* reference teaches a small subunit of potato AGP that comprises a serine and proline at positions 10 and 11 of the amino acid sequence and, therefore, “fragments” of the claimed mutant AGP small subunit protein that comprise serine and proline at positions 10 and 11 read on the Ballicora *et al.* reference. Applicants respectfully traverse this ground of rejection.

Applicants respectfully assert that the Ballicora *et al.* reference does not teach or suggest the claimed invention. By this Amendment, Applicants have amended the claims to specify that the elements and limitations of the full-length mutant small subunit also apply to the “fragments” of the mutant small subunit. The Ballicora *et al.* reference does not teach or suggest a mutant AGP small subunit of a plant having a heat labile wild type AGP enzyme wherein the mutant small subunit confers increased heat stability on a plant AGP enzyme. The Ballicora *et al.* reference is only concerned with the impact of a mutation in potato tuber AGP, which is a heat stable AGP enzyme. Moreover, as the Examiner acknowledges in the Office Action, the Ballicora *et al.* reference was investigating changes in heat stability relative to a truncated version of the AGP enzyme, and not relative to the potato wild type AGP enzyme. In order to anticipate, a single reference must disclose within the four corners of the document each and every element and limitation contained in the rejected claim. *Scripps Clinic & Research Foundation v. Genentech Inc.*, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). The Ballicora *et al.* reference does not teach each and every element of Applicants’ claimed invention. Therefore, the Ballicora *et al.* reference does not anticipate the claimed invention. Accordingly, reconsideration and withdrawal of the rejection under 35 USC §102(b) is respectfully requested.

Claims 1, 2, 17-19, 31-38, 43-45, and 72 are rejected under 35 USC §103(a) as obvious over Greene *et al.* (1998) in view of Giroux (U.S. Published Application No. 2003/0150027) and further in view of Ballicora *et al.* (1999). The Greene *et al.* reference is cited as teaching mutations in the large subunit of the maize AGP enzyme that result in enhanced heat stability. The Giroux publication is cited as teaching transgenic plants, including both monocots and dicots, expressing a mutant form of AGP having mutations in the large subunit. The Ballicora *et al.* (1999) reference is cited as teaching that a cysteine at the N-terminus of the potato AGP small subunit is important for the heat stability of the enzyme and that disulfide bonds formed from a cysteine residue in the small subunit are important for this stability. The Examiner concludes that it would have been obvious to make mutations in maize AGP small subunit whereby a cysteine amino acid is introduced in the N-terminus to increase heat stability of an AGP enzyme. Applicants respectfully traverse this ground for rejection.

Applicants respectfully assert that the cited references, whether taken alone or in combination, do not teach or suggest the claimed invention. As the Examiner acknowledges, the Greene *et al.* and Giroux publications are directed to mutations in the large subunit of plant AGP and do not teach or suggest the claimed invention wherein the mutations are present in the N-terminus of the small subunit of a plant AGP. The fact that some amino acid variants in the large subunit of AGPase resulted in increased heat stability does not teach or suggest or imply, under any circumstances, that there are amino acid variants in the small subunit that increase heat stability. In addition, the Ballicora *et al.* reference does not teach or suggest a mutant AGP small subunit of a plant having a heat labile wild type AGP enzyme wherein the mutant small subunit confers increased heat stability on a plant AGP enzyme. The Ballicora *et al.* reference is only concerned with the impact of a mutation in potato tuber AGP, which is a heat stable AGP enzyme. Thus, a person of ordinary skill in the art at the time of the present invention would not have had a reasonable expectation of success in producing mutant AGP small subunits of a wild type, heat labile plant AGP enzyme that can increase heat stability of the AGP enzyme.

As the Examiner is aware, in order to support a *prima facie* case of obviousness, a person of ordinary skill in the art must generally find both the suggestion of the claimed invention, and a reasonable expectation of success in making that invention, solely in light of the teachings of the

prior art and from the general knowledge in the art. *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). One finds neither the suggestion, nor the reasonable expectation of success, of Applicants claimed invention in the cited references. Accordingly, reconsideration and withdrawal of the rejection under 35 USC §103(a) is respectfully requested.

It should be understood that the amendments presented herein have been made solely to expedite prosecution of the subject application to completion and should not be construed as an indication of Applicants' agreement with or acquiescence in the Examiner's position.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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Attachments: Executed Declaration/Power of Attorney  
Submission of Sequence Listing and Statement under 37 CFR §§1.821-1.825  
New pages 1-102 (Sequence Listing) of the subject specification  
Sequence Listing on computer readable format